

INTRODUCTION

WHAT IS AN EMBRYONIC DUPLICATION?

It is an anomaly that occurs during embryos development, resulting in united animals formation. Embryonic duplications have been most commonly reported in cattle, being comparatively infrequent in cats.

OBJECTIVES

- To review the literature of the embryonic duplications involvement on affected animals and its viability.
- To study internal and external two-faces cat anatomy and compare it with other affected animals.



Figure 1

EMBRYONIC DUPLICATIONS TYPES

The incidence of the different types of conjoined twins is variable. Some authors comment that caudal duplications predominate in cattle and cranial duplications in sheep and goats, while other authors state the opposing view.

MATERIAL AND METHODS

Stillborn male two-faces cat (**Fig.1**). No responsible causes are known for the malformation. A CT scan and a 3D reconstruction were done at the UAB Veterinary Hospital; external examination and dissection of the animal at the UAB Veterinary Anatomy Unit.

RESULTS AND DISCUSSION

Considering the studied animal external and internal features, it can be affirmed that it is a case of **diprosopia**.

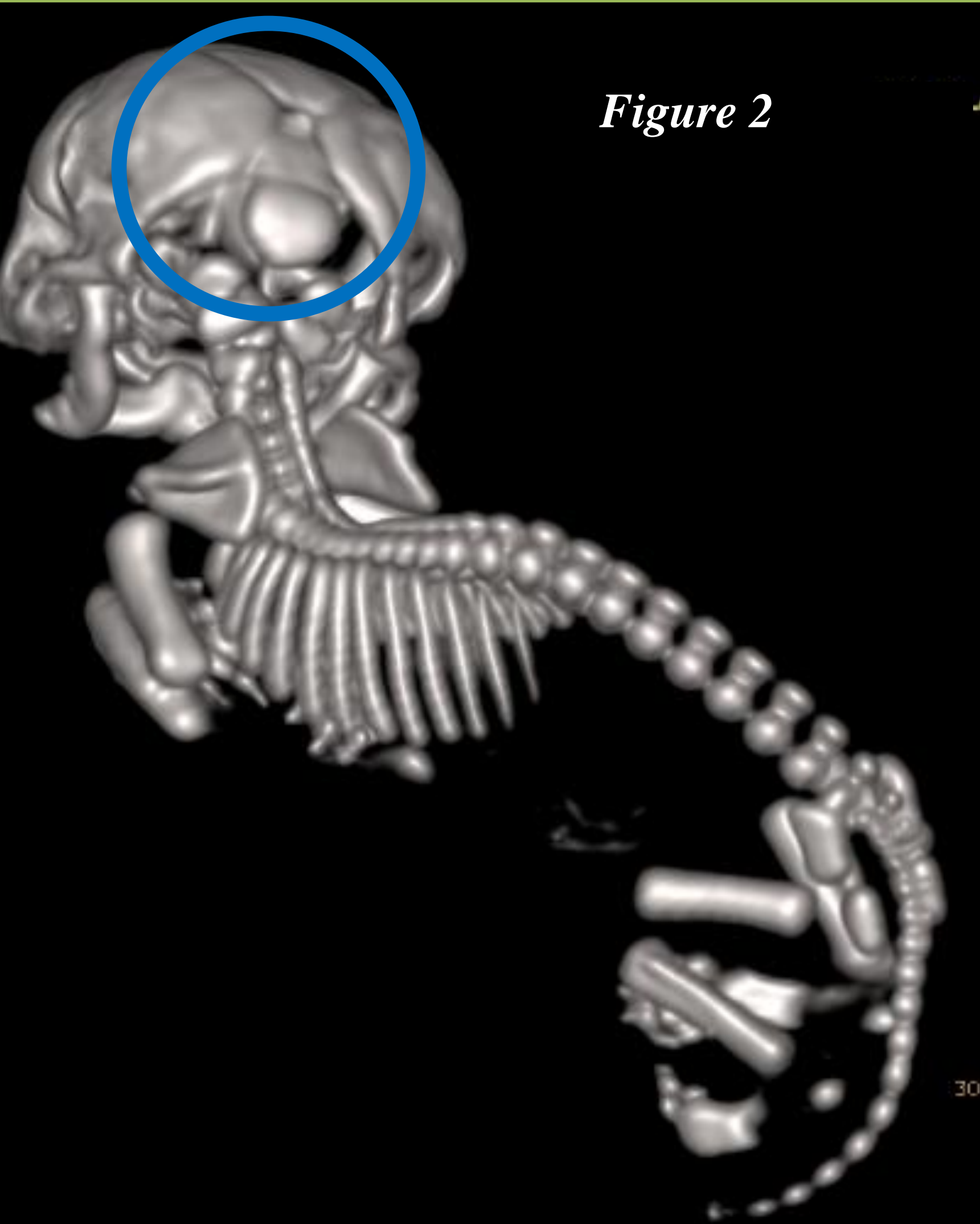


Figure 2

United by parietal, occipital (fig.2) and frontal bones (fig.3). In most described cases, animals are united by the occipital bone. Different part duplications could appear depending on the level where the union takes place.

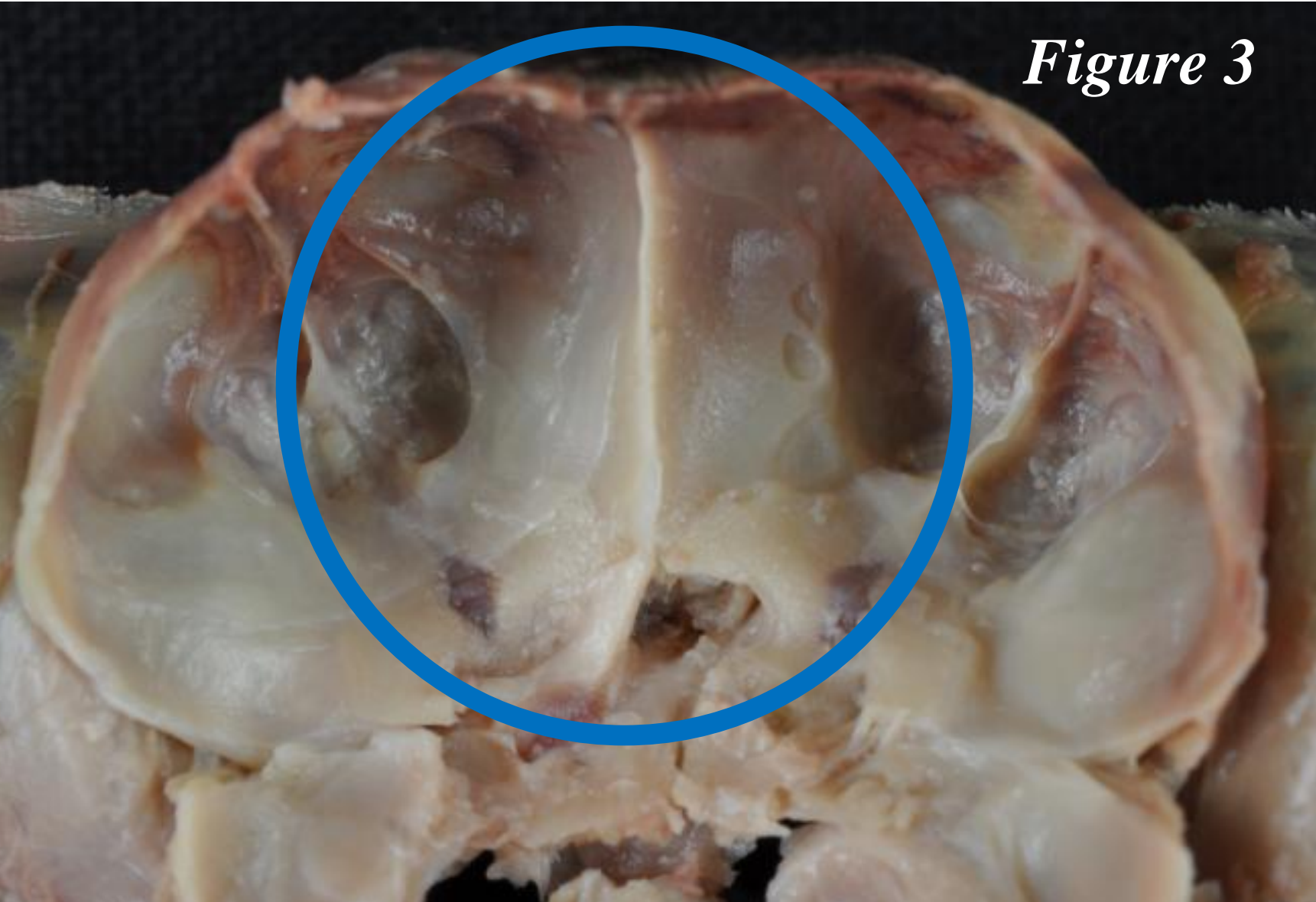


Figure 3

Cheiloschisis at the left face and **palatoschisis at the right one (fig.4)**. Duplications are commonly associated with other anomalies, especially cheiloschisis, palatoschisis and heart defects. Our animal's heart was apparently normal externally.

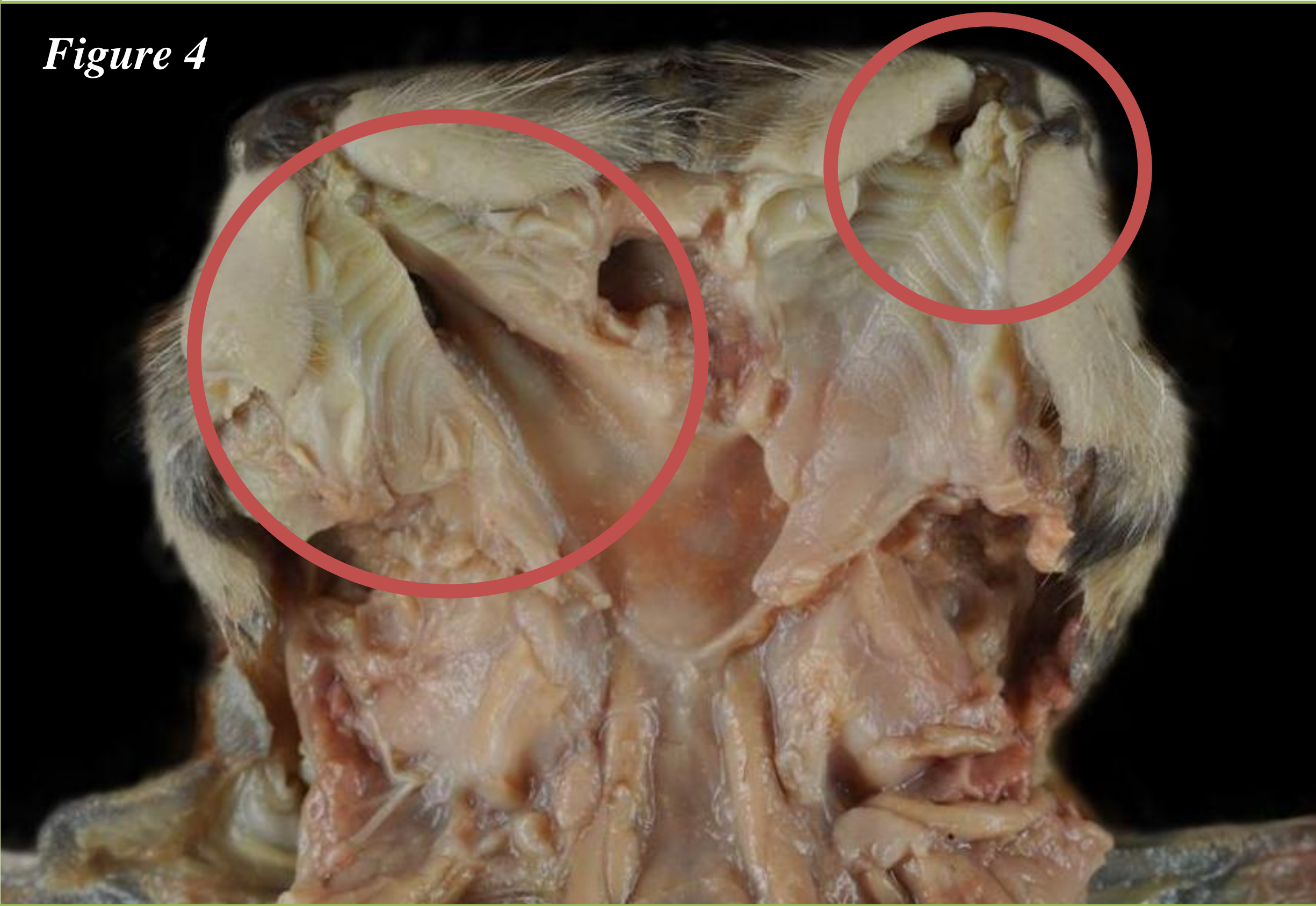


Figure 4

Diaphragmatic hernia (fig.5) with spleen, liver's left lateral lobe and duodenum in the left half of the thoracic cavity. Consequently, **left lung was hypoplastic (fig.7)**. Diaphragmatic hernias are not described as typical malformations in conjoined twins.

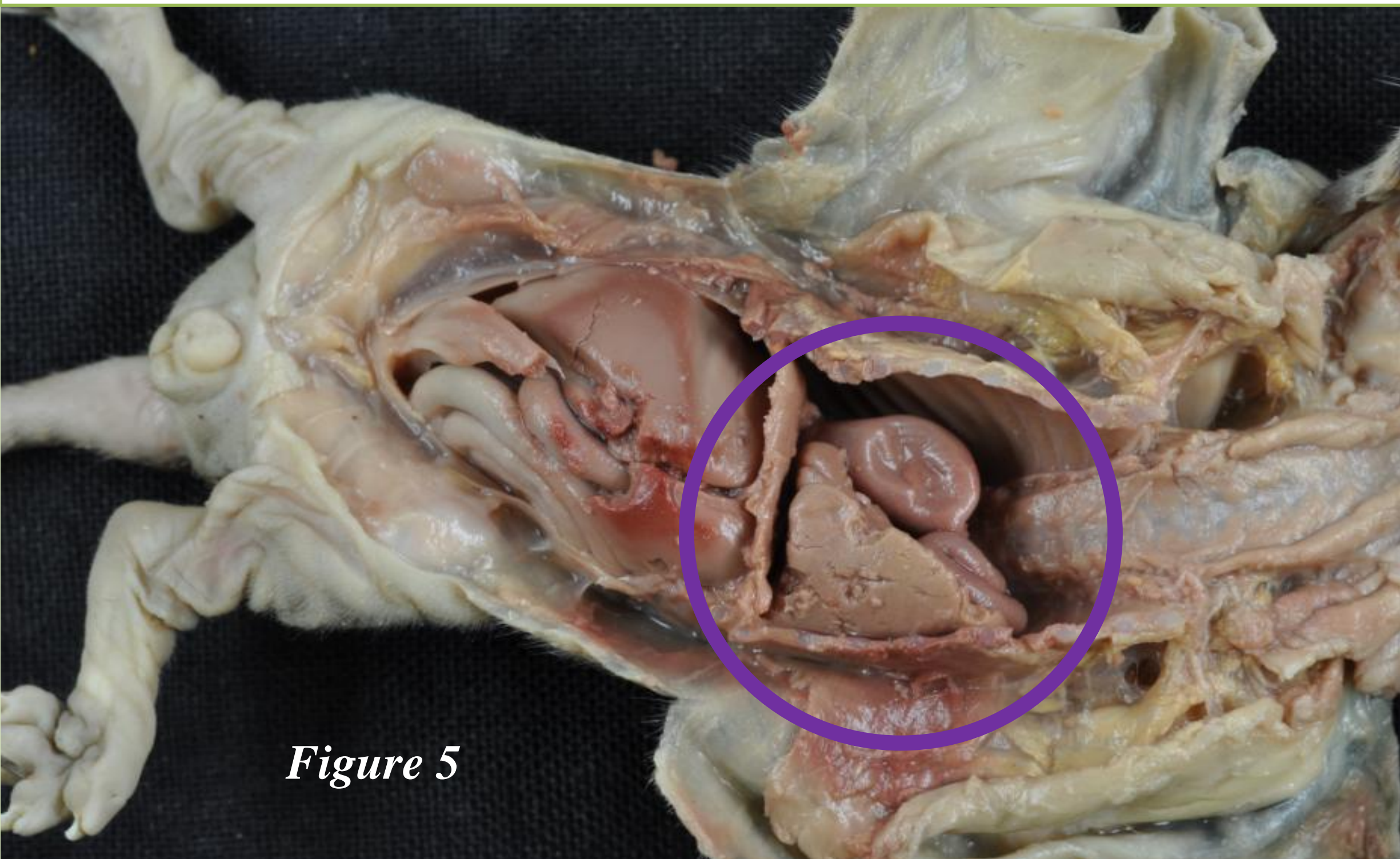


Figure 5

Two isointense round areas observed in TC compatible with **two crystalline existence (fig.6)**. In crystalline's vesicle formation, all the other ocular globes structures are formed.

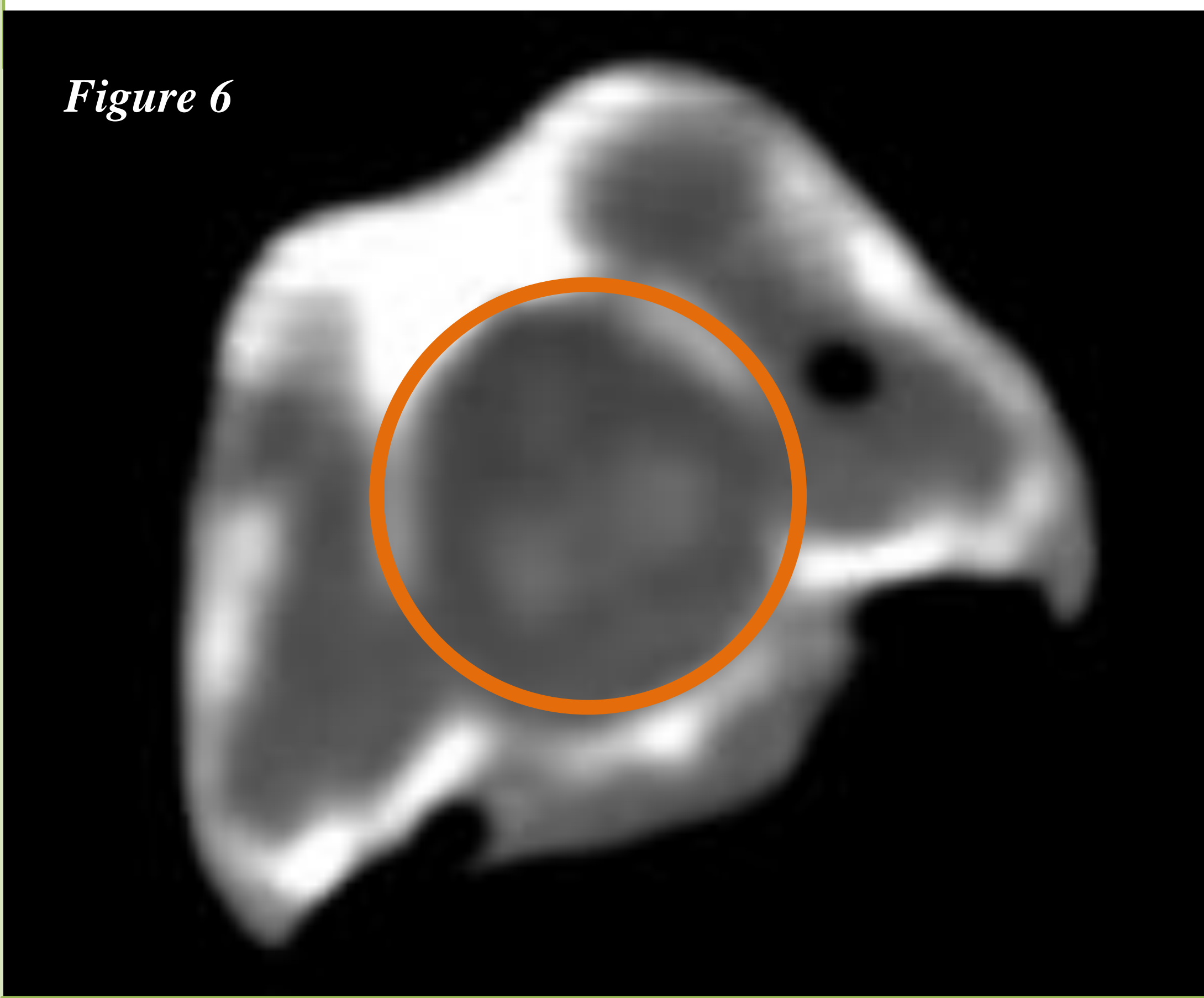


Figure 6

Eyes duplication always implies doubled forebrain. Therefore, **thalamus, hypothalamus and cerebral hemispheres will probably be duplicated.**



Figure 7

Described animal was stillborn, like most of conjoined twins. They are **not viable because of the associated malformations** they present. There are also cases of affected animals totally viable. In 2014, a two-faces cat case was reported, who died at fifteen years old.

CONCLUSIONS

- Following *Gilbert-Barness et al., (2003)* classification, the described animal is classified as diprosopus. *Spencer (1996)* classification does not allow including this type of duplication as the body is not doubled. The **incidence of diprosopia in feline specie is limited** comparing with other animal species, especially lambs.
- As most cases report, **external anomalies of the described cat are accompanied by internal malformations**. However, there is **little information about the cause of associated conjoined twins with internal malformations**.
- Even though it has been impossible to relate any cause with the malformation in this case, it is important, as long as it is possible, **knowing the animal origin**.